

WHAT IS CLAIMED IS:

1. A method of validating stacked substantially flat items, comprising:
stacking items having markings identifiable from an edge,
viewing said stack from at least one angle selected so that said markings of said items are in view,
capturing an image from said at least one angle,
carrying out image processing over said image to produce at least one output indicative of one of edges and edge markings in view, and
using said output to obtain information of items in said stack.
2. The method of claim 1, comprising carrying out said viewing of said stack under predetermined illumination conditions.
3. The method of claim 1, comprising viewing said stack under at least first illumination conditions to obtain a first output indicative of a number of items, and viewing said stack under at least second illumination conditions to obtain a second image indicative of said markings.
4. The method of claim 3, wherein one of said illumination conditions comprises illumination under visible light and a second of said illumination conditions comprises illumination under ultra-violet light.
5. The method of claim 1, wherein a plurality of said items belong to a respective set, and wherein said markings comprise corresponding markings applied to each item of a respective set, thereby to allow items not belonging to said respective set to be readily identifiable.
6. The method of claim 1, wherein said edge markings are unique to individual items.
7. The method of claim 5, wherein correspondence between edge markings comprises respective edge marks in said sets having corresponding lengths.

8. The method of claim 5, wherein correspondence between edge markings comprises respective edge marks in said sets having corresponding positions along respective edges.

9. The method of claim 5, wherein correspondence between edge markings comprises respective edge marks in said sets having corresponding colors under predetermined illumination conditions.

10. The method of claim 5, wherein correspondence between edge markings comprises respective edge marks in said sets having corresponding intensities under predetermined illumination conditions.

11. The method of claim 5, wherein correspondence between edge markings comprises respective edge marks in said sets having corresponding patterns.

12. The method of claim 11, wherein said edge markings comprise a one-dimensional or two-dimensional bar code.

13. The method of claim 5, wherein said items are of rectangular shape, allowing four orientations within a stack, and wherein said markings are equally visible from any given viewing angle irrespective of which of said four orientations a respective item assumes.

14. The method of claim 5, wherein said edge markings comprise an ink viewable only under predetermined illumination conditions.

15. The method of claim 14, wherein each set has a predetermined number of members.

16. The method of claim 15, wherein said determining whether said set is valid comprises determining that said predetermined number of items is present and that each item present has markings corresponding to said set.

17. The method of claim 15, wherein a respective stack comprises items belonging to a plurality of sets, and said determining comprises determining that a total number of items is present which number corresponds to said predetermined number for each of said sets totaled together, and wherein each of said items has markings corresponding to one of said plurality of sets.

18. The method of claim 16, further comprising producing a foreign item output indicating the presence of an item not belonging to said set.

19. The method of claim 18, wherein said foreign item output additionally indicates a location of said item not belonging to said set.

20. The method of claim 1, wherein said items are at least one of paper or cardboard or plastic items.

21. The method of claim 1, wherein said items have thicknesses in the sub-millimeter of a millimeter order of magnitude.

22. The method of claim 1, wherein said image processing comprises image enhancement and item detection.

23. The method of claim 1, wherein said image processing comprises detection of bars and spaces within said edge markings.

24. The method of claim 20, wherein said sets are decks of playing cards.

25. The method of claim 1, wherein said items are flat monetary-value-bearing items.

26. The method of claim 1, wherein said items are at least one of credit cards, debit cards, smart cards, electronic purses, checks, travelers checks, banknotes,

bonds, identity cards, driving licenses, passports, passport pages, security paper, official documents, membership cards, travel cards, tickets and playing cards.

27. The method of claim 1, wherein said items have at least two oppositely facing edges and complementary edge markings on each of said oppositely facing edges so that an orientation of said item is detectable.

28. A set of items, each item in said set having edges, and a marking on at least one of said edges and viewable edge on, respective markings corresponding within said set so that items can be identified as belonging or not belonging to said set on the basis of said marking.

29. The set of claim 28, wherein said marking is visible only under predetermined illumination conditions.

30. The set of claim 28, wherein said marking is invisible under illumination over the visible part of the spectrum.

31. The set of claim 28, wherein each item has at least two oppositely facing edges and wherein markings are placed on each of said oppositely facing edges.

32. The set of claim 31, comprising complementary markings on each of said oppositely facing edges.

33. The set of claim 28, wherein each item has at least four edges, and wherein markings are placed on at least two of said edges.

34. The set of claim 33, wherein each said markings on at least two of said edges are identical.

35. The set of claim 33, wherein each of said markings on at least two of said edges are complementary.

36. The set of claim 28, wherein correspondence comprises a position of said marking along a respective edge.

37. The set of claim 28, wherein correspondence comprises a length of said marking along a respective edge.

38. The set of claim 28, wherein correspondence comprises a color of said marking under given illumination conditions.

39. The set of claim 28, wherein correspondence comprises an intensity of said marking under given illumination conditions.

40. The set of claim 28, wherein correspondence comprises a corresponding pattern in said markings.

41. The set of claim 40, wherein said marking comprises a barcode

42. Stack processing apparatus comprising:

a holder for holding a stack of substantially flat items extending in a planar direction and having edges, said stack extending vertically from said planar direction, and at least one of said items comprising a marking at one of said edges,

an illumination unit for illuminating said stack under predetermined illumination conditions from an angle at which said edge-on markings on edges of said items can be illuminated, an image capture unit for viewing said stack from an angle at which said edge-on markings can be detected so as to view said items edge on and capture an image thereof, and

an image processing unit for processing said image to obtain data from said edges and said illuminated markings.

43. Apparatus according to claim 42, wherein said image processing apparatus is operable to use said data to determine a total number of items in said stack and to identify said items from said edge-on visible markings.

44. Apparatus according to claim 42, wherein said illumination unit is configured to provide a predetermined illumination condition.

45. Apparatus according to claim 42, wherein said illumination unit is configured for providing at least two illumination conditions, comprising first illumination conditions to obtain a first image indicative of edges, and second illumination conditions to obtain a second image indicative of edge markings.

46. Apparatus according to claim 45, wherein one of said illumination conditions comprises illumination under visible light and a second of said illumination conditions comprises illumination under ultra-violet light.

47. Apparatus according to claim 42, wherein said items are organized in sets, and wherein said markings correspond between each item of a respective set, thereby to allow items belonging to said respective set to be readily identifiable.

48. Apparatus according to claim 47, wherein correspondence between edge markings comprises respective edge marks in said sets having corresponding lengths.

49. Apparatus according to claim 47, wherein correspondence between edge markings comprises respective edge marks in said sets having corresponding positions along respective edges.

50. Apparatus according to claim 47, wherein correspondence between edge markings comprises respective edge marks in said sets having corresponding colors under predetermined illumination conditions.

51. Apparatus according to claim 47, wherein correspondence between edge markings comprises respective edge marks in said sets having corresponding patterns.

52. Apparatus according to claim 51, wherein said edge markings comprise a barcode.

53. Apparatus according to claim 47, wherein said items are of rectangular shape, allowing four orientations within a stack, and wherein said edge markings are arranged such that markings are equally visible from any given viewing angle irrespective of which of said four orientations a respective item assumes.

54. Apparatus according to claim 47, wherein each set has a predetermined number of members.

55. Apparatus according to claim 54, wherein said image processor comprises a validator for using said image processing to determine whether item sets are valid, and wherein said determining whether said set is valid comprises determining that said predetermined number of items is present and that each item present has markings corresponding to said set.

56. Apparatus according to claim 55, wherein a respective stack comprises items belonging to a plurality of sets, and said determining comprises determining that a total number of items is present, which number corresponds to said predetermined number for each of said sets totaled together, and wherein each of said items has markings corresponding to one of said plurality of sets.

57. Apparatus according to claim 55, further comprising producing a foreign item output indicating the presence of an item not belonging to a respective set.

58. Apparatus according to claim 57, wherein said foreign item output additionally indicates a location of said item not belonging to said respective set.

59. Apparatus according to claim 42, wherein said items comprise at least one of paper or card or plastic items.

60. Apparatus according to claim 42, wherein said items have thicknesses in the sub-millimeter order of magnitude.

61. Apparatus according to claim 42, wherein said image processor is adapted to carry out item detection.

62. Apparatus according to claim 61, wherein said item detection comprises image enhancement.

63. Apparatus according to claim 59, wherein said items are playing cards being parts of decks.

64. Apparatus according to claim 42, wherein said items have at least two edges and complementary edge markings on each of said oppositely facing edges, said image processor being able to use said complementary markings to detect an orientation of said item within said stack.

65. A method of modifying substantially flat items having faces and edges, for identification of respective items whilst stacked, comprising:
providing said substantially flat items, and
applying markings along at least one edge of each item.

66. The method of claim 65, wherein said marking is provided to a respective face such as to be visible from an edge under at least predetermined illumination conditions.

67. The method of claim 65, wherein said marking is applied to one of said edges of said item.

68. The method of claim 65, wherein said marking is not visible under illumination from the visible part of the spectrum.

69. The method of claim 65, wherein each item has at least two oppositely facing edges and comprising providing complementary marks on said at least two oppositely facing edges so that an orientation of said item within a stack is detectable.

70. The method of claim 65, wherein said items belong to sets, and comprising providing corresponding marks to each item within a given set and non-corresponding marks for different sets.

71. The method of claim 65, comprising providing each item in the same set with a mark having a corresponding length.

72. The method of claim 65, comprising providing each item in the same set with a mark having a corresponding position on said edge.

73. The method of claim 65, comprising providing each item in the same set with a mark having a corresponding color under given illumination conditions.

74. The method of claim 65, comprising providing each item in the same set with a mark having a corresponding intensity under given illumination conditions.

75. The method of claim 65, comprising providing each item in the same set with a mark having a corresponding pattern.

76. The method of claim 75, wherein said pattern comprises a barcode.